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Report to the Chairmen, Senate and House Committees on Armed Services

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COMPOSITE HEALTH CARE SYSTEM

Outpatient Capability Is Nearly Ready for Worldwide Deployment

GAO/IMTEC-93-11

GAO

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Information Management and
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The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

The Composite Health Care System (CHCS) is an automated medical information system being developed by the Department of Defense for use in 664 military medical treatment facilities worldwide. The ultimate purpose of the system is to improve the quality and reduce the cost of providing medical care to beneficiaries of the military health care system.

Legislation requires Defense to conduct an operational test and evaluation (OT&E) of CHCS, perform a cost/benefit analysis, and report the results to the Armed Services Committees before awarding the full-deployment contract.[1] The same legislation requires GAO to monitor the OT&E of CHCS and report to the committees.

The intent of this report is to satisfy our legislative reporting requirement. Specifically, we determined the adequacy of Defense's (1) CHCS OT&E results, (2) CHCS cost/benefit analysis, and (3) plan for full production/deployment of CHCS. Details of our objectives, scope, and methodology are found in appendix I.

Results in Brief

Defense's development of CHCS is progressing, and the problems it is encountering are to be expected when developing and deploying a system of this size and complexity. However, to begin worldwide deployment of the outpatient portion of the system at this time would be a mistake; one that could lead to later problems and greater risks. This portion of the system is not yet ready to be deployed because Defense has not performed a complete OT&E of the system, the cost/benefit analysis for CHCS is still unclear and unsubstantiated, and Defense's plan for deploying CHCS lacks specificity.

[1]The National Defense Authorization Act for fiscal year 1987—Public Law 99-661, Sec. 704, Nov. 14, 1986; as amended by the National Defense Authorization Act for fiscal years 1988 and 1989—Public Law 100-180, Sec.733, Dec. 4, 1987; and as amended by the National Defense Authorization Act for fiscal year 1991—Public Law 101-510, Sec.717, Nov. 5, 1990.

The OT&E that Defense performed on CHCS, while noting several security issues that needed to be addressed, concluded that overall the system was satisfactory. However, this OT&E was incomplete because it did not include two critical system capabilities—the ability to archive patient data and the ability to identify, remove, and prevent the creation of multiple patient records. Basing a decision to deploy CHCS worldwide on an incomplete OT&E is unwarranted from an operational-effectiveness standpoint and poses a potential risk to patient safety.

Defense states that its cost/benefit analysis is complete and supportable and that the CHCS program will not breach the congressionally imposed cost cap of $1.6 billion.[2] However, Defense did not follow standard life-cycle cost estimating procedures to produce these estimates and has not been able to validate CHCS' estimated benefits. Additionally, Defense has not analyzed the sensitivity of its cost and benefit estimates to the assumptions that support these estimates. These uncertainties make the entire cost/benefit analysis essentially unauditable.

Defense's deployment plan for CHCS is only a general statement describing which high-level CHCS functions Defense plans to deploy. The plan (1) does not provide any specific information relating to the deployment schedule or deployment costs, and (2) does not address Defense's strategy for configuring and managing the system's hardware and software.

Background

CHCS is an automated medical information system designed to provide comprehensive, integrated data for patient management and treatment. In November 1991, congressional conferees supported Defense's proposal to deploy CHCS in two phases. The first phase addresses outpatient capabilities, including pharmacy, laboratory, radiology, patient-appointment scheduling, patient administration, outpatient clinical services, and other ancillary services, while the second phase represents the system's inpatient capabilities.

Life-cycle costs for CHCS were capped by Congress during fiscal year 1991 at $1.6 billion. Since March 1988, Defense has obligated over $500 million (actual dollars) for the development of CHCS and, in the past year, has obligated approximately $10 million (actual dollars) per month, primarily for continued CHCS development and operations at 12 test sites.

[2]Unless otherwise indicated, all dollar amounts are in fiscal year 1986 constant dollars.

Between 1988 and 1992, Defense continuously operated and tested CHCS. In January 1992, Defense published the results of its OT&E in a formal CHCS evaluation report, which it submitted to the Surgeons General of the military departments. Subsequently, Defense conducted follow-on OT&E to resolve several of the weaknesses noted in its January report. Approval from its Major Automated Information Systems Review Council (MAISRC) was obtained in May 1992 to begin the first deployment phase—the deployment of CHCS outpatient capabilities. Defense submitted the results of its OT&E and cost/benefit analysis, as required by law, in an October 22, 1992, report to the Armed Services Committees.[3]

OT&E Is Incomplete

The primary purpose of an OT&E is to ensure that only operationally effective and suitable systems are delivered to the operating forces. Testing should be accomplished in an environment as operationally realistic as possible so that an informed decision can be made on whether the system is ready to be deployed. In addition, to help ensure that complete information is available to make this deployment decision, all system functions must be tested.

While the OT&E that Defense performed noted that overall most test areas were satisfactory, it highlighted several unsatisfactory results within CHCS' system/site security area. Items in compliance basically fell within the area of physical security, while items not in compliance included weak user authentication for CHCS network access and the lack of contingency plans for system recovery in case of database loss (from such things as computer failure, power outages, fires, floods, earthquakes, etc.).

More importantly, however, the OT&E did not include two critical system capabilities—the ability to archive and retrieve patient data and the ability to identify, remove, and prevent the creation of multiple patient records. We reported these problems in our May 1992 report.[4] Since then, Defense has completed the development of software for both the archiving and multiple patient records functions. However, Defense has still not formally tested them.

[3]In November 1992, the CHCS Program Manager informed us that Defense intends to deploy its stand-alone laboratory system (SLAB) to approximately 5 medical treatment facilities to replace aging laboratory systems currently installed at these facilities. SLAB is a subset of the full CHCS. CHCS is designed so that single capabilities, such as SLAB, can be activated to operate in a stand-alone mode. Existing legislation allows Defense to justify and carry out such replacements on a case-by-case basis.

[4]Medical ADP Systems: Composite Health Care System Is Not Ready To Be Deployed (GAO/IMTEC-92-54, May 20, 1992).

During the summer of 1992 Defense issued a software maintenance update containing the multiple patient record capability to all CHCS beta test sites.[5] In addition, Defense issued revised patient-registration procedures that further reduce the potential for accidentally creating additional multiple patient records and updated its patient-registration training manuals to reflect the new procedures.

Defense also installed hardware and software to perform the archiving function at both of its alpha test sites—Ireland Army Community Hospital at Fort Knox, Kentucky, and Tripler Army Medical Center in Honolulu, Hawaii.[6] Defense successfully demonstrated this capability to us during visits to Ireland in September and November 1992. However, the function will not undergo OT&E until Spring 1993. Defense has not successfully tested the archive function at Tripler because of delays and problems in stabilizing the newly installed version of CHCS software—version 4.1.

Defense's Analysis of Costs and Benefits Is Unclear and Unsupported

Defense contends that its cost/benefit analysis is complete and supportable and that the CHCS program will not breach the congressionally imposed cost cap of $1.6 billion. However, Defense's October 1992 report to Congress provided no new information that would change the evaluation and conclusions presented in our May 1992 CHCS report,[7] to wit: (1) CHCS life-cycle cost estimates exceed the congressional cap of $1.6 billion when standard Defense life-cycle cost estimating procedures are followed, and (2) Defense has been unable to validate estimated benefits.

Defense is managing within the congressionally imposed $1.6-billion cap by (1) counting only the first 5 years of operating and support costs per site—rather than the full 10 years normally required; and (2) continually deferring or eliminating previously contemplated capabilities, such as future hardware upgrades, which will result in systems with more limited capabilities being delivered to fewer medical treatment facilities than originally expected.

[5]Beta test sites are operational test sites to which system capabilities are deployed for the purpose of conducting operational test and evaluation.

[6]An alpha site is the initial operational site at which system capabilities are deployed. The purpose of deploying system capabilities to an alpha site is to determine suitability for deployment to multiple operational sites to conduct test and evaluation.

[7]GAO/IMTEC-92-54, May 20, 1992.

In its report to Congress, Defense acknowledged using a 5-year rolling-window method of estimating life-cycle costs rather than the standard 10-year operations-and-support-period method, subsequent to full operational capability, as prescribed by Defense policy. Defense states that it was justified in deviating from the standard because it intends to implement a new major automated information system—the Clinical Management System (CLMS)—to replace CHCS 5 years after it is initially deployed. According to Defense, CLMS is needed to make a transition to an open systems environment that uses standard software. We have not been able to verify the need for CLMS, since Defense's October 1992 report was our first formal notification regarding Defense's plans.

In its October 1992 report to Congress, Defense indicated that its CHCS benefit estimate depends upon the future implementation of improved health-care delivery policies and business practices. However, as we noted in our May 1992 report,[8] Defense based these estimates primarily on assumptions regarding enhanced productivity of physicians and nurses, rather than on empirical data derived from actual medical treatment facility operations.

Defense's Deployment Plan Lacks Specificity

Defense's plan for deploying CHCS is only a general statement describing which high-level functions Defense plans to deploy, accompanied by a general deployment schedule. It does not present any cost figures, such as site preparation or initial installation costs, or details relating to configuration management.

Defense currently has several different hardware configurations and versions of CHCS software in operation or under development. The deployment plan, however, does not discuss how Defense will manage and control these different hardware and software configurations. Such a discussion should have been included in Defense's report to Congress.

Without a detailed configuration management plan, Defense does not have any assurance that the hardware or software it deploys will be operationally stable. Effective configuration management procedures must apply to all facets of CHCS implementation at individual medical treatment facilities, including the removal of residual errors from the software. Any deviation from these procedures increases the operational risk to the facility receiving the system. For example, version 4.1 of CHCS worked relatively well at Ireland, a medium-sized facility; however, major

[8]GAO/IMTEC-92-54, May 20, 1992.

problems were encountered when it was installed at Tripler, a large facility.

Conclusions

While CHCS shows promise for enhancing Defense's ability to manage patient data, improve the quality of care, and reduce costs, several major issues still need to be addressed. Defense has not yet completed an OT&E of all essential system capabilities or performed a credible cost/benefit analysis of the system. In addition, worldwide deployment of the system will be difficult, even after these two issues have been addressed, because Defense has not presented an adequate plan for deploying the system.

Recommendations

We recommend that Congress not approve CHCS for worldwide deployment until the Secretary of Defense:

- conducts a successful, formal OT&E of the version of CHCS software that contains both the ability to archive and retrieve patient data and the ability to identify, remove, and prevent the creation of multiple patient records;
- performs a credible cost/benefit analysis;
- prepares a detailed deployment plan that includes deployment costs and a configuration management strategy; and
- submits a report on its formal OT&E results relating to archiving and multiple patient records, cost/benefit analysis, and detailed deployment plan to the Senate and House Committees on Armed Services.

Agency Comments

Despite the fact that it concurred or partially concurred with all of our recommendations, Defense did not agree that worldwide deployment should be delayed. Defense asserted that CHCS has received detailed MAISRC oversight since inception, and that the Department has complied with all internal directives and congressional guidance. Defense also stated that since it was already addressing all of our recommendations, it could begin worldwide deployment using the version of CHCS software approved by MAISRC—version 4.01. Defense's written comments are included as appendix II.

We disagree with Defense's position. We continue to believe that it would be a mistake to begin worldwide deployment of CHCS software version 4.01 because it does not include the archiving and multiple patient records capabilities. The capability to archive patient records is essential to efficient system operations. The existence of multiple patient records is a

threat to a patient's safety because it can result in a physician's providing treatment on the basis of incomplete patient medical information. CHCS' outpatient capability will not be ready for worldwide deployment until Defense (1) successfully completes a formal OT&E of a version of CHCS software that includes the archiving and multiple patient records capabilities, (2) validates CHCS' estimated costs and benefits, and (3) prepares a more detailed deployment plan.

Defense concurred with the recommendation to complete a successful, formal OT&E on the version of CHCS that contains both the archiving function and the ability to identify, remove, and prevent the creation of multiple patient records. It indicated, however, that the recommendation was moot because Defense is already conducting OT&E on these capabilities. We disagree. While it is true that new software and hardware for the archiving function is installed at both alpha test sites, formal OT&E will not commence until Spring 1993, and the software has not yet stabilized at Tripler.

Defense also concurred with the recommendation to prepare a detailed deployment plan that includes deployment costs and a configuration management strategy, but stated that this recommendation was also moot. We believe the recommendation is still valid because the detailed deployment plans that were part of MAISRC's decision process did not include such information as the costs of site preparation or initial installation costs, nor the details relating to configuration management. Since Defense currently has several different active versions of CHCS software, it needs a deployment plan to manage and control the various hardware configurations and software versions (including any maintenance updates or addenda). Defense notes that it is producing a new detailed plan for deployment that addresses changing circumstances. We believe this plan should include detailed deployment costs and a configuration management strategy.

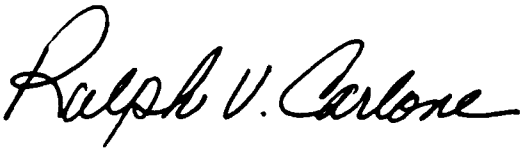
Defense only partially agreed that it needs to perform a credible cost/benefit analysis or submit a formal report on its (1) OT&E results relating to the archiving and multiple patient records functions, (2) cost/benefit analysis, and (3) detailed deployment plan to the Senate and House Committees on Armed Services. Defense continues to assert that MAISRC reviewed CHCS' cost/benefit analysis in detail and found it to be credible and sound. We still believe, as previously stated, that the CHCS cost/benefit analysis is unclear and unsubstantiated. In particular, Defense never tested the sensitivity of its estimates to various assumptions, such as

assumptions regarding the enhanced productivity of physicians and nurses. Additionally, we also note that Defense, while stating that the analysis is credible, has begun conducting a new analysis which will be reviewed by MAISRC.

Defense also does not believe it is necessary to submit another report to Congress. However, we believe a report is still needed because Defense's October 1992 report to Congress discussed an OT&E that is incomplete, contained an unclear and unsupported cost/benefit analysis, and did not contain specific details on how it would deploy CHCS worldwide. As a result, we do not believe Defense's report provided Congress with a basis for authorizing worldwide deployment of CHCS. While Defense did not believe another report was necessary, it stated that it will issue OT&E reports on all future versions of CHCS software, a revised cost/benefit analysis, and a detailed deployment plan when these actions are completed.

We are sending copies of this report to the Chairmen of the House and Senate Committees on Appropriations; the Secretary of Defense; and the Director, Office of Management and Budget. Copies will also be made available to other interested parties upon request.

We conducted our evaluation from June 1992 to December 1992, in accordance with generally accepted government auditing standards. This work was performed under the direction of Frank W. Reilly, Director, Human Resources Information Systems, who can be reached at (202) 512-6408. Other major contributors are listed in appendix III.



Ralph V. Carlone
Assistant Comptroller General

Contents

Abbreviations

CHCS	Composite Health Care System
CLMS	Clinical Management System
GAO	General Accounting Office
IMTEC	Information Management and Technology Division
MAISRC	Major Automated Information Systems Review Council
OT&E	operational test and evaluation
SLAB	stand-alone laboratory system

Objectives, Scope, and Methodology

The National Defense Authorization Act for fiscal year 1987, as amended, requires that GAO (1) monitor the OT&E phase and related CHCS acquisition activities, and (2) submit a report to the Senate and House Committees on Armed Services that evaluates Defense's OT&E results and determines whether Defense conducted OT&E at a sufficient number of sites with sufficient software in operation to warrant a full-deployment decision.

Our objectives were to determine the adequacy of Defense's (1) OT&E results, (2) costs/benefit analysis, and (3) plan for full production/deployment of CHCS. In conducting our review, we reviewed the OT&E processes and procedures Defense and its contractors followed during testing and reporting; obtained and reviewed a copy of Defense's October 22, 1992, CHCS report to the Senate and House Armed Services Committees; reviewed the CHCS life-cycle cost analysis and supporting documentation; reviewed the CHCS benefits reports and supporting documentation; reviewed Defense's most current (May 1992) CHCS system decision paper and supporting documentation; evaluated the monthly progress reports provided to Defense by the CHCS contractor through November 1992; and tracked all delivery orders, including modifications, that Defense issued against the CHCS contract through October 30, 1992.

Since our May 1992 report, we conducted a field review of CHCS operations at 2 of the 14 operational test sites (12 primary test sites and 2 certification sites): Ireland Army Hospital, Fort Knox, Kentucky; and Walter Reed Army Medical Center, Washington, D.C. Fort Knox serves as an alpha test site—a site where initial testing for new CHCS software is conducted. We also met with officials of SAIC (the prime contractor) and officials from the CHCS Program Office in Falls Church, Virginia.

We worked closely with senior program management officials to discuss our concerns as they arose and confirm our understanding of potential problems and their implications for the achievement of test objectives. We briefed senior program management officials during our review and have incorporated their views where appropriate.

Comments From the Department of Defense

THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

December 3, 1992

Mr. Ralph V. Carlone
Assistant Comptroller General
Information Management and
Technology Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Carlone:

This is the Department of Defense response to the General Accounting (GAO) draft report entitled -- "Composite Health Care System (CHCS) Is Not Ready for Worldwide Deployment," dated November 23, 1992 (GAO Code 510858), OSD Case 9269. The Department does not agree that worldwide deployment should be delayed.

Since its inception, the Composite Health Care System has received detailed oversight from the Major Automated Information System Review Council. The Department of Defense has complied with all DoD Directives and congressional guidance. It is, therefore, the DoD position that the Composite Health Care System deployment should begin, using version 4.01, as approved at Milestone IIIA and consistent with the guidance contained in the Report (102-328) of the Committee of Conference for the DoD Appropriations Act for 1992 (P.L. 102-172), dated November 26, 1991.

Due to the very limited comment period provided to the Department, the DoD is only responding to the recommendations. When the final report is issued, a comprehensive response will be provided.

* * * * *

- **RECOMMENDATION 1:** The GAO recommended that the DoD conduct a successful, formal operation test and evaluation of the version of the Composite Health Care System that contains both the ability to archive and retrieve patient data, and the ability to identify, remove, and prevent the creation of multiple patient records. (p. 13/GAO Draft Report)

  DoD Response: Concur. The recommendation is, however, moot. The DoD is already conducting operational testing and evaluation on these capabilities now. The archive and retrieve capability is operational and performing as expected. Therefore, in accordance with public law, the deployment plans for the Composite Health Care System remain

as approved by the Major Automated Information System Review Council. Deployment should proceed as long as the testing of the archive and retrieve capability continues to yield satisfactory results. The software for handling multiple patient records is currently operational in the version of software (version 4.01) approved by the Major Automated Information System Review Council for deployment. The DoD position is that deployment should begin now, as approved by the Major Automated Information System Review Council and Congress.

- RECOMMENDATION 2: The GAO recommended that the DoD perform a credible cost/benefit analysis. (p. 13/GAO Draft Report)

  DoD Response: Partially concur. The DoD takes strong exception to the GAO implication that the current cost/benefit analysis is not credible. The analysis of cost and benefits that formed the basis for Milestone IIIA, (1) was reviewed in detail by the Major Automated Information System Review Council, (2) was found to be credible and sound, and (3) represented constraints and strategy in effect at that time. As agreed to at the Major Automated Information System Review Council at the Milestone IIIA review, the Composite Health Care System Program Office is currently conducting an analysis of the program based on funding levels in the fiscal years 1994-1999 budget, site-by-site cost-effectiveness, plans for medical support outside the continental United States, and downsizing. The DoD is creating a revised deployment schedule, a new cost profile for the program, and a new benefits projection. The program revision will be reviewed by the Major Automated Information System Review Council. In addition, the DoD will continue to validate benefits projections, both at existing sites and by collecting key indicators at new sites, before and after the Composite Health Care System implementation.

- RECOMMENDATION 3: The GAO recommended that the DoD prepare a detailed deployment plan that includes deployment costs and a configuration management strategy. (p. 13/GAO Draft Report)

  DoD Response: Concur. The recommendation is, however, moot. The DoD prepared detailed deployment plans that formed the basis of the Milestone IIIA approval. These were the plans available for GAO review at the time of onsite audit work. However, the DoD is now in the process of producing a new detailed plan for deployment that addresses changing circumstances driven by (1) site-by-site cost effectiveness determination, (2) downsizing, (3) evolving plans for military medical support outside the continental United States, and (4) affordability considerations for the period of fiscal years 1994-1999. The new plan will describe

actions already taken by the Program Office to address the needed improvements in site-level configuration management. The Department anticipates that the new plan, while executable, will continue to evolve due to rapidly changing strategy for military force levels.

- **RECOMMENDATION 4:** The GAO recommended that the DoD submits a report on its formal OT&E results relating to archiving and multiple patient records, cost/benefit analysis, and detailed deployment plan to the Senate and House Committees on Armed Services. (p. 13/GAO Draft Report)

  DoD Response: Partially concur. The DoD does not agree there is a necessity for submitting another report to Congress. The DoD will, however, issue Operational Testing and Evaluation reports on all future versions of Composite Health Care System software, as well as a revised cost and benefits analysis and detailed deployment plan. The DoD anticipates no significant changes for those sites listed in the deployment schedule for fiscal years 1993 and 1994, as *presented* at *Milestone* IIIA. In the April 1993 time frame, those plans and reports will be available for review by all interested parties.

* * * * *

Given that the Department is already addressing all the GAO recommendations, it is the DoD position that the worldwide deployment of the Composite Health Care System should be implemented.

Sincerely,

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Assistant Secretary of Defense
(Health Affairs)

Duane P. Andrews
Assistant Secretary of Defense
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Major Contributors to This Report

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Atlanta Regional Office	Don M. Howard, Senior Evaluator

Related GAO Products

Medical ADP Systems: Composite Health Care System Is Not Ready To Be Deployed (GAO/IMTEC-92-54, May 20, 1992).

Medical ADP Systems: Changes in Composite Health Care System's Deployment Strategy Are Unwise (GAO/IMTEC-91-47, Sept. 30, 1991).

Medical ADP Systems: Composite Health Care System: Defense Faces a Difficult Task (GAO/IMTEC-90-42, Mar. 15, 1990).

Medical ADP Systems: Composite Health Care System Operational Tests Extended (GAO/IMTEC-89-30, Apr. 10, 1989).

Medical ADP Systems: Analysis of Technical Aspects of DOD's Composite Health Care System (GAO/IMTEC-88-27, July 11, 1988).

Medical ADP Systems: Composite Health Care System Acquisition—Fair, Reasonable, and Supported (GAO/IMTEC-88-26, Mar. 4, 1988).

Medical ADP Systems: Composite Health Care System Operational Test and Evaluation Costs (GAO/IMTEC-88-18BR, Jan. 28, 1988).

ADP Systems: Concerns About DOD's Composite Health Care System Development Contracts (GAO/IMTEC-87-25, June 8, 1987).

ADP Systems: Concerns About the Acquisition Plan for DOD's Composite Health Care System (GAO/IMTEC-86-12, Mar. 31, 1986).